

REMARKS

This paper is responsive to a non-final Office action dated November 28, 2003. Claims 1 – 47 were examined. The Examiner has indicated that claims 11, 12, 16 – 18, and 32 – 36 are allowable. Applicant appreciates the indication of allowable subject matter.

Preliminary Matters

A preliminary amendment was filed on January 22, 2003. The preliminary amendment amended the specification and added new claims 48 – 52. The Office Action does not indicate entry of the preliminary amendment. Applicant respectfully requests entry of the previously filed amendment. For convenience, a copy of the previously filed preliminary amendment and a copy of the facsimile confirmation are attached.

Rejections under 35 U.S.C. §102(e)

The Examiner has rejected claims 1 -10, 13 – 15, 19 – 31, and 37 – 47 under 35 U.S.C. §102(e) as being anticipated by International Patent Application Publication No. WO 00/00885, naming Mario Wolczko as an inventor ("*Wolczko*"). Applicant respectfully traverses all of these rejections.

As a preliminary matter, Applicant respectfully notes that a published International Application cannot itself constitute §102(e) prior art.(see 35 U.S.C. §102(e)). Proper rejection would be based on §102(a) of the statute. Accordingly, the response that follows presumes a rejection under §102(a).

*Wolczko* does not disclose or suggest sampling lifetimes of a representative set of objects, and adapting storage management actions (e.g., pretenuring), based on the sampled lifetimes, **both the sampling and the adapting occurring during runtime**. The Office Action fails to appreciate that *Wolczko* relies on information from previous executions of code. *Wolczko* discloses a memory management scheme that recompiles methods based on information collected from previous executions of the methods. **Applicant's claims are distinct from techniques that utilize prior runs of programs, and instead claim sampling lifetimes of memory objects during program execution or runtime to adaptively affect tenuring or**

other storage management decisions. By sampling using techniques disclosed, a subset of a program's software objects can be observed at runtime without significantly impacting performance. In contrast, *Wolczko* generates and updates histograms based on previous executions, and recompiles methods based on the histograms. Referring more specifically to Applicant's claims, the Office Action does not identify any reference that discloses or suggests any of the following:

(claim 1) sampling, at run-time of an execution sequence, lifetimes of a representative subset of memory objects in the generational memory; and

pretenuring, based on the sampled lifetimes, at least some of the memory objects allocated from the generational memory during the execution sequence.

(claim 20) sampling, during a program execution, lifetimes of memory objects from the representative subsets; and

tailoring, during the program execution, a storage management action based on the sampled lifetimes for a corresponding one of the categories.

(claim 28) an object sampler operable to sample lifetimes of at least a subset of objects instantiated in the computational system during execution of a program; and

a storage allocation facility operable during the execution of the program to allocate new objects corresponding to respective of the sampled objects based at least in part on the sampled object lifetimes.

(claim 46) means for altering object category-specific storage management policies at run-time in response to the lifetime predictions.

With regard to independent claim 41, *Wolczko* does not disclose or suggest 1) sampling instances of software objects to maintain lifetime predictions, or 2) **maintaining per-category object lifetime statistics based on a sampled subset of objects using weak references and associated allocation time information.** *Wolczko* does not disclose or suggest use of weak

references as in claim 41, and especially does not mention using weak references for maintaining per-category object lifetime statistics.

For at least the above reasons, all of Applicant's independent claims are allowable and dependents therefrom are also allowable. However, the Office Action also assumes that *Wolczko* discloses utilization of memory object categories, which it does not. The Office Action employs this mistaken assumption in the rejection of claims 5, 6, 9, 10, 20, 31, and 41. The Office Action refers to a section of *Wolczko* that discloses manipulation of an allocation site identification code. The section discloses using the allocation site identification code to calculate a death rate. The section further discloses stripping the code from tenured objects when their allocation site is recompiled, but there never is disclosure of memory object categories. With specific reference to Applicant's claim language, the Office Action has not identified any reference that discloses or suggests the following:

- (claim 5) allocating the memory objects using category-specific allocation functionality; and selectively modifying the category-specific allocation functionality to pretenure, on subsequent allocations, memory objects corresponding to those of the categories for which the sampled lifetimes exceed a metric;
- (claim 6) instantiating category-specific allocation methods that allocate new objects of a corresponding category directly into a tenured generation of the generational memory;
- (claim 9) wherein the categories are object class-specific;
- (claim 10) wherein the categories are call-site specific;
- (claim 20) selecting representative subsets of memory objects for each of plural categories thereof;...and tailoring, during the program execution, a storage management action based on the sampled lifetimes for a corresponding one of the categories (claim 20);

(claim 31) object type;  
 allocation call site;  
 activation record stack state;  
 thread id; and  
 receiver object.

and

(claim 46) means for altering object category-specific storage management policies at run-time in response to the lifetime predictions.

Wolczko does not anticipate any of Applicant's claims. For at least the reasons above, independent claims 1, 20, 28, 41, and 46 are allowable, and dependents therefrom are also allowable at least for the reasons above.

### Conclusion

In summary, claims 1 – 52 are in the case. All claims are believed to be allowable over the art of record, and a Notice of Allowance to that effect is respectfully solicited. Nonetheless, if any issues remain that could be more efficiently handled by telephone, the Examiner is requested to call the undersigned at the number listed below.

#### CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that, on the date shown below, this correspondence is being

- ☐ deposited with the US Postal Service with sufficient postage as first class mail, in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
- ☐ facsimile transmitted to the US Patent and Trademark Office.

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 Date

Respectfully submitted,



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